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Factory Report 1950

An improvement is made on the publishing date of the Factory Report over last year, but there is still room for progress towards a return to the pre-war position. It is pleasing to learn that the number of accidents in 1950 again showed a substantial reduction. The actual figures since the war (1945-51) read: *Non-fatal* 11,947; 13,225; 12,911; 12,482; 11,003; and 10,740. *Fatal* 36; 31; 27; 29; 20; and 24. Thus there has, with a vastly increasing production, been a reduction of 18.8 per cent. since 1946. The general trend of fatal-accident figures, though variable, is in the right direction.

There is a special section in this 1950 Report dealing with foundry accidents and some useful information is provided on accidents occurring under the main headings and a hint is given that the industry does not pay sufficient attention to the question of lifting. The opinion is expressed that incorrect methods are used, that men attempt to lift moulding boxes which are patently too heavy for one person; that space congestion creates the inability to lift materials properly, owing to the impossibility of assuming a proper stance, and so forth. Then there are the cuts men receive when handling improperly-prepared sand which still contains "flash." It is suggested gloves, or at least pads, should be worn. Provision is insufficient—they simply *must* be worn—as must goggles, for eye accidents are far too frequent. Magnetic separators should be installed in all ferrous foundries. The use of spats for men handling liquid metal is also stressed. Only recently a case was reported of a man being badly burnt because he used his spats as an article of adornment for outside wear but discarded them when at work.

We were pleased to see that the Report stresses proper tool maintenance as one of our friends, a melter, lost his eye by using a mushroom-topped pricker bar. It is a type of accident so easy to prevent. The question of "falling bodies" is of major importance—one wonders how over a 1,000 accidents occur from this cause. Cupola charging and patching can be a cause, as also can be faulty stacking of moulding-boxes.

Moulding machines come in for some criticism, as there must have been some cases of crushed fingers, but a survey of the whole situation reveals but little of real practical application. This is a case for "safety first" propaganda rather than mechanical devices. Core-blowing machines of the horizontal type have also caused the same sort of accidents and similar measures must be taken. Attention is also called to accidents which have taken place in the tunnels carrying the spillage sand, where "nipped" fingers have occurred by their being trapped between the belt and the rollers. The "special accidents" which occurred received publicity at the time of their happening. The shutting of a man inside a mould-drying stove is a type of accident which neither legislation nor other device can prevent. It just should not happen; nor should that arising from damp ladles. The former is just a case of *savoir-faire* and the second neglect of well-known technology. However, in general, the Report is appreciative as to the progress the foundry industry is making not only in accident reduction but also of the steps being taken to reduce the silicosis risk.

B

Dinner

Foundry Coke Merchants' Association

The 3rd Annual Dinner of the Foundry Coke Merchants' Association, was again held at the May Fair Hotel in the West End of London. Mr. Arnold Carr presided over a gathering numbering about 160. Immediately after the Loyal toast had been honoured, Mr. Carr, on behalf of the Association, presented Mr. R. Causebrook with an inscribed silver salver as a souvenir of the recipient's enlightened conduct of the office of honorary secretary of the London branch of the Association.

The first toast was to the suppliers—The Carbonization Branch of the National Coal Board. It was proposed by Mr. J. J. Selby, who intimated that owing to a quite sudden illness, Mr. Leslie O'Connor was unable to be present. However, he was pleased to announce that his colleague, Mr. R. H. Thomas, had kindly stepped into the breach. The Association was formed eleven years ago in London and had now expanded to embrace the whole country. He was proud to state that no foundry had ever closed through lack of coke—at least so far as London was concerned. Mr. R. H. Thomas, O.B.E., replying to the toast stated that he was not entirely ignorant of the coke trade as he had spent most of his life as a coal and coke merchant. This experience, shared by many of his colleagues, made for friendly co-operation between the carbonization branch of the National Coal Board and the coke merchants.

Mr. H. Basil Darby, in a very happy speech proposed "the other guests," to which Mr. Barrington Hooper replied in his own inimitable style.

Mr. T. H. Summerson, the chairman of the British Steel Founders' Association, in proposing the Coke Merchants' Association pointed out that not all steel founders were consumers of foundry coke, some relied on electricity for melting. He was, however, appreciative of the services given by the coke merchants, and wished the Association every possible success. Whereas formerly, it was a practice of theorists and other ill-disposed persons to attack Trade Associations as being anti-social bodies, designed purely for the enrichment of their members and the impoverishment of their customers, he was convinced that the community, or at least its best-informed members, were now able to recognize that members of Trade Associations are intent not only upon their own interests but also upon those of their customers, their employees and, indeed, the nation at large.

The chairman, Mr. Arnold Carr, in replying said that during the eleven years of their existence the Foundry Coke Merchagts' Association had grown to such an extent that they were handling over 70 per cent. of the coke entering the foundry industry, not only iron, but also steel and non-ferrous. He thanked Mr. F. Arnold Wilson for his work in organizing the dinner. The company was entertained by Billy Phelps and the Two Macs.

New Dictionary of Metallurgy

The February issue of *Metal Treatment and Drop Forging*, a sister publication of the FOUNDRY TRADE JOURNAL, has started a serial article of wide interest. It is a really up-to-date dictionary of metallurgy by Dr. A. D. Merriman, G.C., O.B.E., D.Sc., and J. S. Bowden, B.Met. We note that a number of trade names have been included, but it is none the worse for that, as people do need a source of reference for the best-known ones. An interesting feature is that, where necessary, illustrations are used. It is easily the best compilation the reviewer has so far encountered covering this particular field.

Aachen Foundry Symposium

The 15th "Aachener Giesserei-Kolloquium" and the opening of the new Foundry Institute is to take place from March 12 to 15. A special programme has been arranged. On Wednesday, 10 a.m., the proceedings are to be opened by the playing of the Overture to "Die Meistersingers" by the State Orchestra. Then there will be speeches of welcome and the opening ceremony. Following this, there is a lecture on the Electron Microscope by Professor Von Borries followed by more music. At 8 o'clock, there is to be a banquet and other attractions. On Friday morning starting at 9.30 there are first four papers dealing with various phases of modern cast iron, mainly by Professor Pirwowarsky and his staff. Following this there are a series of papers on the "C" process, supersonic testing of cast iron, transverse testing of centrifugally cast iron, melting and casting *in vacuo* for research purposes. After luncheon two simultaneous sessions are to be held. Amongst interesting subjects to be dealt with in session A are basic cupola practice and other phases of cupola melting and statistical control. Session B is largely devoted to non-ferrous foundry practice and malleable. Amongst the lecturers in the latter section is Mr. H. Schulte of Sutton Coldfield, who reads a paper on "Modern Annealing Ovens." In the evening there is to be a festival dance at the new hydro. On Saturday there is a meeting of the old students' association.

Details of the "Kolloquium" can be had from the Giesserei-Institut der Rhein-Westf. Technischen Hochschule, Aachen, Intzestrasse 1, Germany.

Zinc-rich Paints

The Corrosion Committee of the British Iron and Steel Research Association has issued the following statement about zinc-rich paints:—

> The use of the term "zinc-rich paint" should be restricted to paints containing a sufficiently high percentage of zinc pigment to ensure direct electronic contact between the metallic particles in the dry paint film. There are theoretical reasons for believing that in the simplest case this will not occur unless the metallic zinc constitutes 92 to 95 per cent. by weight of the dried paint film—the exact value depending on the specific gravity and other properties of the vehicle.

The Corrosion Committee sponsored the work at the Cambridge University metallurgical laboratories which, during the early years of the last war, led Dr. Evans and Dr. Mayne to establish the usefulness of such paints in resisting corrosion, and the form in which they can be most effective. Zinc-rich paints are now finding numerous domestic and industrial applications.

London Branch "Men Only" Dinner

The "stag" party held last year by the London branch of the Institute of British Foundrymen was so successful an event that it is being repeated this year at the same place—the Horse Shoe Hotel, Tottenham Court Road, on March 21, at 7 for 7.30 p.m. London and district members are invited to attend and bring along male guests. Tickets, price 21s. are obtainable from Mr. A. R. Parkes, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2, who is assisting the honorary branch secretary on this occasion. Places are limited, and early application for tickets is recommended. Requests for tickets received from actual members up to March 8 will be given preference, and thereafter tickets will be allocated to guests in order of application. After March 8, no preference will be shown.

Design of Iron Castings*

By K. H. Collinson

Speaking as a designer, apparently of woodworking machinery, the Author discusses the development of new conceptions of industrial design. These arise out of the discarding, in turn, of the purely functional and the over-curvacious. He showed himself aware of the requirements of the foundrymen, but declined to be completely subjugated by their demands when designing—appearance appeal and other æsthetic and technical requirements could be over-riding. From the discussion, it appeared that making castings for woodworking tools is not particularly remunerative and that foundry methods, casting quality and finish have to be related to this factor.

Generally speaking, all members of an engineering organization are unanimous in one opinion—and that is that the designer is at the root of all the evils that beset them: but no one suffers more painfully from the results of his evil work than the designer himself. He is a one-man unexploded-bomb disposal squad. No one knows so thoroughly as he does how bad his work is, and he lies awake at night wondering which particular bomb is going to blow up on the morrow.

The perfect designer would be a man who was master of several arts and Jack of none of them—a Dr. Jekyl and Mr. Hyde, with a young man "Seek" thrown in for good measure: Dr. Jekyl, the well-trained engineer, thoroughly versed in every detail of the plant which will produce his designs, and equally well trained in the operation of the machines he must devise. Such knowledge is indispensable for production with maximum economy and to ensure complete satisfaction on the part of the man who will use the machine of his design. Mr. Hyde would be the artistic side of his character—he suffers from an incurable urge to clothe with comely shapes and pleasing lines the nakedness of those bare skeletons produced by the mere designer mechanic. What a menace, if he is not properly trained, he can be to those patient men who spend their lives building inverted sand-castles in the foundry floor! The young man "Seek" would be the creative side of him: he is the eternally "youthful-in-outlook" creative mechanic who provides the germs out of which all new design ideas grow.

Reality

The creative mechanic is seldom the inventor of the machine he designs: usually he sets about the job because he has been told to re-design an existing model, or to produce a modified version of some competitor's machine. If he can envisage some completely original combination of mechanisms, or some new application of electrical, hydraulic or electronic devices, so much the better: it will help him to hold his job a little longer—but more often he must be content to juggle with well-known and already well-tried mechanisms.

Even so, his problems can be very complex and call for much expert knowledge and imagination. He is the one being in an engineering organization who can be allowed to give his imagination full rein and it is his ability to build mental pictures of unmade mechanisms and test them to destruction mentally that gives him hope of success as a creative mechanic. He tends therefore to live in a world of his own—the children of his brain live in his imagination and grow there for a long time before they ever see the light of day as pictures on a drawing board—and some of them prove to be an everlasting source of embarrassment to their misguided parent.

Basic Requirements

Fundamentally there is only one problem in the design of a machine—whether it be textile machinery, with its light loads and high speeds, or whether it be a machine-tool, with its ever-increasing loads and speeds—that is to produce relative motion between a workpiece and a tool. Because of the ease and comparative cheapness with which they can be produced, grey-iron castings have so far formed the principal components of most machines, and the size and shape of those castings have been determined in the first place largely by the forces acting upon them.

The power unit producing those forces is now almost universally the electric motor—or motors—and one of the *most* important preoccupations of the designer must be to proportion all those separate links which bridge the gap between the source of power and the scene of activity (where the tool and the workpiece are locked together in "mortal combat") with such perfection, that each link in the bridge shall be strong enough to support its allotted load. It would be pleasing to discuss the subject of the mathematical analyses and those crossword puzzles, with equations and matrices that those good at sums perform, to ascertain what loads the links are likely to be called upon to bear, but it would not be of much interest! Actually, the work of the designer, from the mathematical point of view, has experienced as complete a revolution as has that of the art of the moulder—it has been *mechanized*.

No longer is it necessary for the designer to make tiring and often decimally incorrect calculations to ascertain the modulus of a section and he need no longer draw very doubtful diagrams to obtain an all too vague estimate of the critical speed of a shaft. He no longer needs to work out those

* A Paper read before the West Riding of Yorkshire branch of the Institute of British Foundrymen, Mr. Simpson presiding.

functions called involute; to help his gears to behave as well-trained dentures should. Cam-caused contortions in linkages have been tamed and put behind the bars of graphs, and so it goes on.

Nowadays, all this information is brought to the designer on the "conveyor-belt" of the "handbook"—whether it be that of Mr. Molesworth, Mr. Machinery, Mr. Kempe, or another. Also, the British Standards Institution, with ever-increasing enterprise, is keeping him to the straight and narrow path of experience—with the white lines of its publications on tolerances and the preferred dimensions it sets out for machine parts. Further, a flood of light is being thrown by the photoelastic experts on obscure problems connected with the "nervous exhaustion" which afflicts machine parts when overworked, and which is so difficult to diagnose by a simple process of addition and subtraction, except for that star turn the electronic brain, who slips out of line to drag back a simple answer to the most difficult question, by that process, almost before it has been asked.

Widening Field

There is no intention to convey the impression that the ever-widening field of engineering training, the designer—the creative mechanic—is being given by the universities and the technical colleges, is now being rendered useless by the devices mentioned—very far from it! The overhead scaffolding of graph and chart and the chain conveyors of "serve-yourself" technical information are freeing his mind from those menial mental tasks which stultified his imagination, besides occupying too much of his time, and they are in effect activating his "grey matter" and stimulating him to a wider and more comprehensive grasp of the spirally-expanding mechanical universe that is his hunting ground—and not always a happy one!

The creative mechanic is essentially a man who is expected to have "ideas" and if possible convey them on paper to the productive team, and if he is honest he knows he owes a great debt of gratitude to those able people who bring his ideas to life, but this healthy sense of humility is much enhanced by his growing knowledge that it is the high-level theoretical work that is being done that makes possible the mechanized flow of information which he uses.

Improved Appearance

It was not surprising that the creative mechanic, having so many purely mechanical problems on his mind, and usually having very little knowledge of art, gave, until comparatively recently, very little thought to inculcating a sales-appeal, through an improvement in the appearance of his machines. It was not until the designers of motor-car bodies became infected with the enthusiasm of the aircraft builder and applied to car bodies what was quite appropriately called streamlining, that the public began to associate the bulgy smooth outline of the motor-car with progress and efficiency, and even to demand a new fashion of bulginess every year to keep up that feeling of progress and efficiency. The machine manufacturer soon became aware of this development in public taste, and, urged on no doubt by a necessity to adopt any useful measures he could find to meet increasing competition, he began to apply the bulgy, smooth outlines so suitable to fast moving vehicles, to his products—often with anything but pleasing results.

Voluptuous Curves

The spidery style of Victorian times had graduated through the solid functionally sound stage of two or more decades until it suddenly underwent metamorphosis into a kind of bald-headed, portly, Pickwickian figure! Though anything but beautiful, this bulgy style, which had been developed primarily for air-flow reasons and because it made possible the work of the pressed-steel artists, also appealed in some ways to the foundry. The smooth contours, which simplified the operation of die-work, were also a help from a moulding point of view, though the patternshop shook its head over the added complications of having to substitute the blending of curves for the simpler process of making rectangular shapes.

Loss of Functional Efficiency

It was soon found that these well-intentioned efforts were far from satisfactory. For example, a large sweeping cover which seemed to have value from an æsthetic point of view, was sometimes found to make the operator take-up an uncomfortable position, because it caused him to have to stretch over it, or failed to give him foot-room. Again, because it was found possible in the bulgier style to build-in the motor drives, it was forgotten that electric motors and V-ropes are heat generators, and necessary ventilation and access for maintenance was often overlooked. Moreover, motors which were unnecessarily large had to be fitted and maintenance became more expensive than it need have been.

That ruthless critic, the customer, was not slow to point out these faults to the manufacturer, who was thus constrained to give new consideration to the whole question of appearance for sales appeal. He found that a new branch of art had been quietly but persistently gaining recognition—the art of industrial design—and he encouraged his design staff to study its principles, and in some cases he called in specialists in the new art to style his machines for him. The result is that the early clumsy efforts to give machines a "new look" have given place to a better-planned approach producing an appearance which not only emphasizes the functional characteristics of the machine, but also inspires confidence in its ability to perform satisfactorily, and so creates in the prospective buyer a desire to possess it, which is, of course, the ultimate aim of all design.

Industrial Design

The new artist mechanic learns that he must think in three dimensions, whereas the designer of decorative fabrics, carpets, wall-papers, etc., works

in two: he finds he must develop his ability to sketch fluently in perspective. The old-style engineering draughtsman, although he thought in three dimensions of mass, normally conveyed his meaning to his productive colleagues by drawings in two dimensions. The result has been that, all too often, the designer's meaning has been lost to the man in the shop because of the latter's lack of training or aptitude for reading engineering drawings, and inability to formulate three-dimensional mental pictures of masses from a mere flat elevation, side-view and plan.

The industrial designer brings a new language into the drawing office: he opines that the fundamental problem of machine design for " appearance appeal " is to manipulate the masses of the machine " harmoniously " so that they shall possess " unity, variety, rhythm and formal balance "—qualities which give to a machine an appearance of dignity and impressiveness. He can even explain why one shape is better than another (though one may not be able to follow his arguments). He even delves into the past and presents to the founder's wondering eyes that perfect shape known as the " golden rectangle "—admired by that very great engineer artist, Leonardo da Vinci. It was a side of engineering design to which the Author had paid insufficient attention, until he read an article, some 15 or 16 years ago in one of the technical journals by that master of industrial design, Mr. Van Doren, of the U.S.A., in which he worked out, step by step, the development of a well-fashioned and finished design from a simple square.

[The Author concluded by showing slides of Van Doren's illustrations and adding comments to bring out the elementary conceptions of modern design as variants of simple shapes.]

DISCUSSION

MR. NICHOLLS asked whether, when designing the castings, Mr. Collinson first of all designed the gears or whether he designed the casting and placed the gears inside. On many machines the designer did not give any consideration to the fact that in the manufacture of the castings many of them would have to be split in different directions and therefore the taper affected the ultimate result of matching-up. When he came to make side-struts and top-covers, they would have to be split in a different manner and, when they came to be machined, the works complained that the top casting overlapped.

MR. COLLINSON, in reply, said that Mr. Nicholls had hit upon a question to which he was sure he knew the answer. One inevitably started with the spindle; generally, it had to be a certain height from the ground for the operator's comfort; then followed the auxiliary parts. These things were almost invariably placed in a set position, and then one certainly fitted a " suit of clothes " round the job. He emphasized that the " suit of clothes " was becoming smoother and smoother. Personally, everything he did was generally in consultation with the foundry. One did not always follow what was suggested; there were other considerations that interfered. The fact that due consideration had not been given to the directions as to splitting the pattern, and the fact that the machine shop complained, resulted in overlapping parts and beads being fitted which covered that fact. He agreed that every designer should be urged to study this point.

MR. BLAKISTON said he had had some experience of making woodworking machinery castings, and they were diabolical castings to make. Unfortunately, that was coupled with the fact that woodworking machinery was very cheap. A machine-tool cost ten times more, and why a woodworking machine was so cheap, although it was of such a complicated design in comparison with a heavy machine-tool, he failed to understand. He asked Mr. Collinson to explain as to the manner in which he co-operated with the foundry to obviate cracking troubles.

Cracking Troubles

MR. COLLINSON, agreeing with Mr. Blakiston that woodworking castings were extremely difficult to make, pointed out that woodworking machinery generally speaking was sold to a poorer market than that for machine-tools. The small man starting up as a cabinet maker, with hardly any money at all, could not afford to invest much money on a machine, and he generally started with a cheap one. That did not answer Mr. Blakiston as to why one could make them cheaper. He could not explain that at all. As to the question of castings cracking, the designer did consult with the foundry. But how often he helped the foundry he did not know. The foundry usually suggested thickening up; a very obvious thing one could do was to use judicious ribbing and turned-in edges for plates.

MR. WORCESTER said he had had much experience with woodworking machinery, and what had developed in design suggested a really big step in the right direction. Thirty years ago he helped a firm to re-design its products. He had one recollection of a casting about 12 ft. long; it stood on one side and another side had no support at all—it was a three-quarter bed. He suggested that by turning it over and putting on two ends it could be made largely in another way. These castings were $\frac{7}{16}$ in. thick. A casting of that size was not an easy job for a foundryman. His firm developed rounded curves on the corner and internal ribs to hold the castings together. One must expect the foundryman to ask for a little extra thickness.

Influence of Factory Regulations

MR. HAMMOND asked whether the progress of the Home Office factory regulations in respect of the shrouding of exposed driving mechanism had any bearing on the trend of design. There was also the question of the appearance of the casting. Could the lecturer indicate to what degree extra care was taken in the provision of surface finish of a casting and as to what steps were taken to present the finished machine in a suitable condition for the market, as compared to what was satisfactory a few years ago?

MR. COLLINSON said the factory regulations certainly did influence, no doubt very greatly, the

general "clothing" of a machine. It was quite evident that when the designer had been forced to cover up the main part, the most stupid of them would jump to the conclusion that he could make that part an integral part of the machine. That, he suggested, had been the main cause. As regards the appearance, he quite agreed that the large smooth areas that are now so common on large castings of the woodworking type are really a source of trouble from an appearance point of view. If they were near the bars of boxes, with all possible care in ramming, in certain lights one would see where these bars had been and there was nothing one could do about it. He saw a machine at Olympia recently, with a beautifully smooth hood on the top of the machine that, had it been pressed steel, would have been a thing of beauty; instead of that it was marred by hills and dales. Such large areas called for the wholesale application of grinding. The great proportion of such surfaces were dealt with by a rather expensive application of labour to remove blemishes and applying filler and then painting. This put up the cost of the machine.

MR. WORCESTER said that thirty years ago nobody would have dreamed of adding the expense of dry-sand work; machinery was very cheaply produced. He had set about making all the bigger castings by skin drying, and the best possible surface was obtained by drying the face of the mould. A clean surface would eliminate much of the paint cost. He used to save a considerable amount of drying by throwing into the mould bits of waste soaked in paraffin and setting the whole lot on fire. It produced a very fine surface on the casting.

Cost Factor

MR. COLLINSON said there was one factor he had already mentioned, and that was the question of cost. Such application of drying moulds put up the cost of a casting.

MR. WORCESTER explained that there was nowhere near the same amount of care necessary taken in ramming. Many jobs could be dried by portable stoves. It cost the foundry a little more for handling—that was, carting to the stoves and back again—but it certainly saved by the reduced ramming-up time for the moulds.

MR. NICHOLLS said there was a slightly greater tendency to crack in a dry-sand mould compared with the green-sand mould in the casting of woodworking machinery.

MR. COLLINSON said every designer would be grateful for information on that subject; they did not purposely do things to cause difficulty.

MR. WORCESTER said one could carry out slow cooling in dry-sand practice which would certainly help to overcome cracking.

MR. NEATH, referring to the slides shown, said the thought passed through his mind that first of all the factory inspector should have been present. This new design met the modern desire for cleanliness. Another thing was the guarding that saved people's fingers from damage and at the same time saved the gears and chains from damage. Some improvement on the life of the covered driving mechanism must have resulted. Another danger was, "out of sight out of mind" thinking. Things could easily go wrong and cause breakdowns when they were not visible. It emphasized the necessity for really keen maintenance. He did not know whether Mr. Collinson had had any experience since his new designs had been marketed, as to whether failures increased because the parts were out of sight.

MR. COLLINSON pointed out that, since the development of the cover on the machine coincided with the use of ball bearings instead of brass bearings, to that extent it did help. The danger of breakdowns because the mechanism was hidden was, he thought, entirely outweighed by the extra protection obtained by complete enclosure.

MR. WORCESTER said some of the newer textile machines had much of the covering carried out in Perspex and one could see the whole of the moving parts.

MR. COLLINSON said that was a most commendable idea, but it was a question of the cost of Perspex as against iron or steel.

Painted Surfaces

MR. HAMMOND, referring to the painting of castings, said he had on occasion encountered people who were making machinery of a similar type and they had experienced difficulty in the paint being rather dull. There was also trouble with the paint and the filler interfering with the function of the castings. It was their method to paint castings prior to machining and the casting entered the machine-shop in a painted condition, and then the machined surfaces were left in a machined condition. Had Mr. Collinson any experience of the procedure most common in practice?

MR. COLLINSON said he painted the castings with a primary coat immediately they left the fettling shop and with other coats before they reached the fitter. Thereby he distinguished between rough fettling and the fettling that was necessary to produce the final smoothness. As the machine was built and finished there was then only the question of final filler and finish paint being put on. One must take the precaution before painting to put plugs in the holes into which screws or shafts fitted.

Unremunerative Lines

MR. HARGREAVES, referring to the cost of woodworking machinery, suggested makers did not pay enough for the castings for one thing. He knew one or two small foundries who would very much like to get rid of the work they did for woodworking-machinery makers. It was a question worth studying and a matter for comment as to just what the difference was between the price of heavy machine-tool castings and woodworking-machinery castings. Why was there a difference? He had heard of quite a number of woodworking-machinery firms changing from one foundry to another. The small founder seemed to get overloaded with such work and the price was poor.

(*Continued on the facing page, col.* 2)

Flame Hardening by Oxy-town-gas

The Peddinghaus oxy-town-gas system of flame hardening recently introduced in this country by Surfard, Limited, of Abbey House, Victoria Street, London, S.W.1, marks a notable technical advance in the surface hardening of steel. One of the principal advantages of flame hardening is that it permits the use of straight carbon steels in place of the costly and scarce alloy steels. The use of ordinary town gas for this purpose offers considerable advantages.

The principal problem in flame hardening has always been the human element in judging the critical temperature to which the work has to be heated. The rapid rise in temperature essential to flame hardening renders the use of the usual type of radiation pyrometer out of the question owing to the slow response of direct indicating instruments or again the time required to adjust the disappearing filament type. This problem has been successfully resolved by Peddinghaus, who have recently developed what they call the Milliscope. By its novel design the device enables temperature rises far in excess of the heating speed to be measured within fine limits. This makes it possible by linking the instrument to a Peddinghaus flame hardening machine to obtain precise automatic control of hardening temperature. Long runs of components may be accurately and consistently hardened and the human element in the estimation of temperature entirely eliminated. Even if the Milliscope is not coupled to a flame hardening machine so as to make the process completely automatic, the instrument is of great assistance to the operator. It gives him warning of the approach of the critical temperature and then accurately indicates the moment at which it is reached.

One of these machines demonstrated in operation in London last week was of the vertical type in which small spindles up to rolls of nearly 5 in. in diameter and 24 in. long could be progressively hardened. The component is held between centres and rotated at about 100 r.p.m., two semi-circular oxy-town-gas burners having a narrow slit which emits a ribbon of intense flame are used for the heat input. These burners, and the quenches which are situated below them, are mounted on a carrier which is raised hydraulically throughout the length of the part to be-hardened. On this carrier is mounted the "working head" of the Milliscope which is sighted on to the portion of the work being hardened, close to the zone of heat produced by the burners. In this way, the Milliscope follows this zone throughout the travel of the burner. Naturally the faster the burners rise, the lower the heat input to the component and *vice versa*. The speed of the burner rise is set slightly slow so that the tendency is for the temperature of the work to exceed the value preset for the job. Immediately this happens, however, the direct current generated by the Milliscope causes a magnetic valve in the hydraulic system to permit more oil to pass to the cylinder so increasing the speed of the burner travel, thereby reducing the temperature.

AT KEIGHLEY, last week, a fine of £100 was imposed on C.W., haulage contractor and scrap-metal dealer, for receiving scrap metal valued at £62 5s., knowing it to have been stolen, and he was also ordered to make restitution of £52 for another quantity of metal he had received. Three employees of Prince-Smith Stells, Limited, worsted machinery makers and founders of Keighley, W. J. Albone, T. Smith, and G. Bird, all of Keighley, were charged with stealing jointly as servants a quantity of scrap metal, belonging to their employers. All pleaded "guilty."

Names on Castings

By "Chip"

Many methods are employed to cast the maker's name on castings, the choice often depending on the particular casting being made and the position it occupies in the mould. Sometimes it is advantageous to prepare the name as a core and insert it in a suitable coreprint. Often this method leaves a fin on the casting, which, unless carefully fettled, detracts from its appearance. Especially is this true when the surface of the casting is curved in two directions, as in Fig. 1, where A is the coreprint. To ensure a good match in such cases, it is good practice to cut a piece out of the pattern, as B, Fig. 2, and fit in a piece and work it as Fig. 3. This can then be removed and placed in a frame corebox and the name fixed to it. The slot B can then be filled with the portion to form the coreprint, Fig. 4.

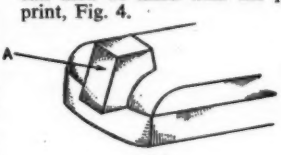


FIG1

FIG2

FIG3

FIG4

FIGS. 1 TO 4.—*Means of Adding a Name-piece to a Casting by Using a Loose-piece, a Coreprint, and a Suitable Core-box.*

Design of Iron Castings

(*Continued from facing page*)

MR. BLAKISTON, referring to production costs, said the man/hours per ton for woodworking-machine castings were exactly double the man/hours per ton of a foundry making machine-tool castings. That statement had been based on work in several foundries.

MR. HARGREAVES asked whether Mr. Blakiston could say as to which price needed adjustment.

MR. SIMPSON (branch president), after complimenting the lecturer, called upon Mr. Johnson and Mr. Kershaw to propose and second a vote of thanks to Mr. Collinson.

This having been done MR. COLLINSON replied that before thanking the members for their reception he would like to emphasize that as a designer he had learned half he knew from the foundry itself. He would not hesitate at any time if it were in his power to alter anything that the foundry asked him to alter, but there were other considerations to be borne in mind besides making an easily-moulded casting.

FORMS OF APPLICATION are now available for participation in the Conference on Recruitment, Training, and Education, arranged by the C.F.A. at Ashorne Hill, March 12 to 14. These may be had by writing to the secretary, Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1.

Excavators and Jib Cranes

Two men were killed recently by a new universal-type single-bucket excavator, which had been fitted with a grab for the purpose of transferring gravel from a barge to a hopper. One of the men was an experienced demonstrator employed by the manufacturers of the machine, while the other was a labourer.

During the process of picking up spillage from the floor beside the hopper, the driver pulled the lever to open the loaded grab. The grab failed to open and crashed on to the hopper, but after some manœuvring it opened and emptied. Acting on the instructions of the demonstrator, the driver then lowered the grab and tried to open it, but he failed to do so and the hoist rope slackened so much that it sagged below the drum. After some more manœuvring to try to open the grab, the jib started to rise and continued to do so until the main clutch was taken out. The hoist rope was then found to be fast outside the drum flange in a position where it would probably so affect the clutch actuating the jib hoist that the jib would be raised at the same time as the grab.

With the object of obtaining sufficient slack rope to permit the release of the rope which was fast outside the drum flange, the jib was then raised as high as was thought to be safe, but slack rope was still not obtained. An attempt was therefore made to rotate the drum by manual effort both before and after the guard on the top side of the drum had been taken off. Unfortunately, during the latter attempt, the jib moved back through the vertical position and swung downwards more than 20 deg. towards the hoisting drum, where it trapped and killed the two men who were trying to free the rope.

Safety Measures Recommended

As many excavators and jib cranes are used at quarries, the Minister of Fuel and Power has thought it important to make the facts known so that precautions against a repetition of the accident can be taken immediately. Simple and obvious precautions are:—

(1) To issue written instructions and post notices to the effect that:—

(*a*) no jib shall be raised to a position from which there is any possibility of its inadvertently swinging through the vertical position and falling back on to the machine; and

(*b*) the driver shall inform the person under whose direction he works immediately there is any untoward occurrence which renders the machine unfit for use.

(2) To provide means to indicate to the driver the highest position to which the jib may be raised, having regard to any gradient on which the machine may work.

In addition, there is the question of providing these machines with positive safeguards. Since the double fatality described above, the excavator in question has been fitted with a buffer stop which is met by the jib on being raised 78 deg. above the horizontal with respect to the position of the machine on level ground. In another instance, the

(*Concluded at the foot of col.* 2)

owner of a number of universal excavators has had them fitted not only with a buffer stop, but also with a device to disconnect the main clutch just before the jib would come into contact with the stop.

The Minister hopes that owners and agents of quarries will at once give careful consideration to the desirability of applying some such positive safeguard to every machine in present use which is so constructed that otherwise the jib can swing back through the vertical position; and that they will take steps to ensure that such a safeguard is incorporated, before delivery, in any machine of this kind acquired in future.

Mond Nickel Fellowships

The Mond Nickel Fellowships Committee now invites aplications for the award of Fellowships for 1952. The main object of these Fellowships is to enable selected applicants of British nationality and educated to University degree or equivalent standard to obtain additional training and wider experience in industrial establishments at home or abroad, so that, if they are subsequently employed in executive or administrative positions in the British metallurgical industries they will be better qualified to appreciate the technological significance of research and to apply its results. There are no age limits, though awards will seldom be made to persons over 35 years of age. Each Fellowship will occupy one full working year. It is hoped to award five Fellowships each year of an average value of £750 each.

Applicants will be required to define the programme of training in respect of which they are applying for an award, as well as particulars of their education, qualifications and previous career. Full particulars and forms of application can be obtained from the secretary, Mond Nickel Fellowships Committee, 4, Grosvenor Gardens, London, S.W.1. Completed application forms will be required to reach the secretary of the committee not later than June 1.

Ironfoundry Output in 1951

Official figures for the output of iron castings for 1951 have just been released by the Council of Ironfoundry Associations. Total output is 3,754,527 tons as compared with 3,486,892 tons in 1950. Approximately 88 per cent. of this increase has been achieved to meet the demands of the following vital industries:—housing; railways; machine-tools; motor-cars; agriculture; gas, water and sewage; electricity; shipping; Diesel engines; valves, pumps and compressors; textile machinery and steelworks equipment. The output has been obtained by an improvement in productivity—24.714 tons per man/year in 1951 as compared with 23.195 in 1950.

Wartime Ribbon Development

During the war period enforcement action against certain buildings or works which contravened the ribbon development restrictions was postponed, and since 1947, when the Town and Country Planning Act was passed, such development has been treated as if it were the subject of planning permission granted for a limited period.

The effect of an Order in Council now made is that local planning authorities, if they so desire, can require the removal or alteration of temporary development of this kind. They are, however, not obliged to take any such action, because in suitable cases permission may be granted to retain the buildings or works for a further period.

History of Aluminium-alloy Casting*

By A. P. Fenn, A.M.I.Mech.E.

So much has been written and presented in papers on aluminium and its alloys of the various processes used in the production of castings, and the variety of treatments that can be applied to those castings, that it is exceedingly difficult to find the subject matter for a paper that does not repeat, in one way or another, previously-published information. Most of the articles published have, however, dealt with one or other aspect of production, and it was felt that a review of the developments that have taken place in the aluminium foundry during the last 40 years would provide at least a certain amount of useful information and at the same time create material for an interesting discussion.

Early Conditions

In order to gain an overall picture of the developments and progress that has taken place during the last 40 years, one must first examine the aluminium foundry industry at the end of 1911 to obtain a datum line on which to build a picture of these developments. At that time, aluminium alloys were restricted to two, known as 6B and No. 12. 6B alloy was composed of approximately 3 per cent Cu. and 11 per cent. Zn., the balance being aluminium. In those days, the inclusion of impurities was completely ignored and there are few, if any, records of mechanical tests being taken during production, or of any analytical checks being made. It was possibly only when a serious failure took place that an approach was made to one of the universities in an endeavour to find the cause of the trouble. The method of producing the alloy was crude, as all foundries purchased the metals they required and made up their heats for each furnace by placing in a container the required weight of aluminium, copper, and zinc, and it was the responsibility of the furnaceman to see that the alloy was correctly made. The method adopted was by rule of thumb. The copper and about 50 per cent. of the aluminium were first melted together, subsequent to which the remainder of the aluminium was added to the furnace and finally the zinc and the whole mix well stirred. When the furnaceman thought it looked about right, the castings were made and everyone hoped for the best.

From this it can be seen that the furnaceman was the "king pin" of the foundry, as any error on his part would easily scrap a whole day's cast. When this happened, deep consternation was caused as, apart from the loss of the castings, no one knew what could be done with the metal and this had to be melted and ingotted, then stored away until assistance and advice could be obtained from specialists, usually at Sheffield University.

The second alloy mentioned, No. 12, was a straight aluminium-copper alloy containing 10 per cent. copper: this was, however, only used on very special jobs, the 6B alloy was the general-purpose alloy. This was possibly the secret of early success, as each foundry had to deal in general with one alloy only. To complete the picture it is only necessary to record that sand casting was the only process in use at that time in this country.

Progress

Having painted the picture of the early days, next can be considered the developments and the order in which these occurred. The first of note was the process of gravity-die or permanent-mould casting. At the time under consideration, Cothias in Paris was developing this process which, in those early days, was revolutionary in the results obtained by its accuracy of dimensions and surface finish compared with sand castings. It is not surprising, therefore, that the process was brought over to this country in the latter part of 1912 or early 1913. The process held special appeal at that time to the automobile and motor-cycle industry in particular and it was the introduction of the gravity-die-casting that brought the 10 per cent. copper alloy into prominence, all castings then being produced in this alloy.

The advent of the first world war in August, 1914, was the occasion for an effort to get some standardization in the industry, as up to this time there were no specifications for aluminium casting alloys, and the two which have already been referred to became the basis for the first British Standards, namely L5 and L8 respectively. As is usual under war conditions, considerable progress was made during this period. The first point of importance was that, consequent upon the development of gravity-die-casting and its production rate compared with sand casting, many parts were turned over to this process. At the same time, it was soon evident that L8 alloy was not suitable for a number of these and a new alloy with a lower copper content was introduced to specification L.11.

"Y" Alloy

One of the biggest developments during this period was the introduction of "Y" alloy which was developed by Dr. Rosenhain and his associates at the National Physical Laboratory. This was the first effort to produce an aluminium alloy having certain definite characteristics and mechanical properties, and while it was an exceedingly difficult alloy to handle in the foundry, its properties were such that it opened up a new field of applications for

* Paper delivered to the London branch of the Institute of British Foundrymen, Mr. L. G. Beresford presiding. The London section of the Institute of Metals were the guests of the foundrymen at this meeting. The Author is on the staff of Birmingham Aluminium Casting (1903) Company, Limited.

FIG. 1.—*Lowering the Fourth Radial Core into Position in the Vacuum Filter Casing Mould; 24 of these Cores were required, each being located by a Metal Dowel fitting into a Cup on the Main Core.*

aluminium-alloy castings, where strength at elevated temperatures was an important feature. The introduction of this alloy did a lot to improve the foundry methods and practices, as it was found that by careful pyrometric control of the metal many of the foundry troubles disappeared. It also introduced a new operation into the foundry, namely, heat-treatment of castings. Dr. Rosenhein can therefore be credited, by the introduction of " Y " alloy, with having done more to introduce technical control into the aluminium foundry than any other individual.

During this period, also, leading foundries equipped and staffed their own laboratories and for the first time regular checks were made on the composition of each alloy. This was most essential as new applications were coming in daily, especially through the rapid development that was taking place in the aircraft field and particularly in engine design. Cylinder-blocks for water-cooled engines such as the R.A.F. 4A and the Sunbeam air-cooled " Arab," cylinder barrels for the BR.1, BR.2, and Clerget engines together with pistons for all types were a few examples of entirely new products in aluminium alloys.

Foundation of Present Industry

Among all who were in any way connected with the aluminium foundry industry during the period of the first world war, there is not the slightest doubt but that there would be a general agreement that this period stands out as the one in which the greatest amount of development took place and it can be classified as the period in which the real foundations of the present industry was laid. This, of course, is readily understandable as it was also the period in which the foundation of the aircraft industry of this country was also laid and the latter, particularly as far as engines were concerned, relied on the aluminium foundry to produce the goods. The cessation of hostilities at the end of 1918, and the return to civil activities which commenced in the early part of 1919, found aluminium foundries comparatively well equipped to undertake the production of castings by either of the two available methods, sand and gravity-die casting. The knowledge gained by the founders during the war period was put to very useful account, and for the next few years technical development was keeping step with the demands which the engineering industry made on it.

Alloy Metallurgy

The improvements which had taken place in technical control by the establishment of laboratories and mechanical-testing shops, opened up a new sphere of activity for the young men of that time and many turned their attention to the study of metallurgy in view of the demand for suitable men to staff the laboratories which had already been equipped. Many metallurgists turned their attention to the improvement of existing alloys and also to the development of new alloys and to investigating the mechanical and physical properties of each. Many alloys, of course, were discarded after a very short life, others were put into general use and some have stood the test of time and are with us to-day.

Two or three of these alloys are worthy of mention, for instance:—Alpax, the aluminium/silicon alloy, which in its early days was known under D.T.D. 25 before being elevated to the B.S.L. Series and which for many years was always under the careful and watchful eye of the late Richard Deeley. The " RR " Series of alloys is mainly the outcome of the work of Bradbury and Hall and the group has proved its worth in both the aircraft and general engineering field over a period of years. " Birmabright," the aluminium/magnesium alloy for marine application, was the product of the brain of the late Percy Pritchard who was also responsible for many other developments in the foundry industry.

Foundry Processes

Leaving the metallurgical field for the time being, a quick survey of the developments which were taking place on the more mechanical side of the foundry shows that progress was being well maintained in this direction, as the sand foundry was rapidly becoming more mechanical and gravity-die casting was being mechanized to a certain degree by the use of various devices such as racks, pinions, etc., which not only made the dies easier to operate but lengthened their life and also increased production.

In the latter part of the 1920's, attention was turned to the pressure-die-casting of aluminium alloys. Pressure-die-casting of lead- and tin-base alloys had been practised in this country for many years using the submerged plunger type of machine, but aluminium alloys could not be used for the production of castings on these machines on account of the rapid attack of aluminium on the iron or steel parts. Doehler in the United States had been quietly working since 1915 on the development of a gooseneck air-operated machine for aluminium and this system so revolutionized the production of parts in aluminium alloys that it can readily be understood that interest was soon shown in this country and work commenced on the production of die-castings, using the air-blown or gooseneck system.

Gooseneck Machine

The method adopted in this case was to immerse a U-shaped vessel in a bath of molten metal from which it could be fed by partly rotating the vessel on trunnions. The filling nozzle was automatically sealed when the vessel was brought into its working position and the molten metal was forced into the die under an air pressure of approximately 600 lb. per sq. in. With this system, the temperature of the metal is kept rather on the high side to ensure that very fluid metal is injected at high velocity through a comparatively small orifice into the die. This method gives a very accurate reproduction of the die impression, but owing to certain disadvantages, particularly a liability to considerable iron pick-up, the alloys that could be used were restricted, the iron content at the end of an 8-hr. shift becoming as high as 4 per cent. A further disadvantage also was the tendency towards internal porosity, this however was not seriously detrimental in many unstressed applications.

Cold-chamber Process

By 1934, it was evident that some change of method of casting was desirable in order to overcome the limitations of the air-blown system, with the result that the cold-chamber process was adopted. This practically eliminated all the disadvantages of the older gooseneck process. In the cold-chamber process the operative portion of the machine consists of a cylindrical cold chamber, a plunger operated by a hydraulic cylinder and a mould or die. The casting in this is made by pouring the molten metal into the chamber through an aperture provided for the purpose and then by forcing it into the die through a suitable passage or gate, in this case the pressures are so adjusted and controlled as to give the correct casting condition.

Since the metal is taken from an independent melting pot, which, if desired, can be of graphite or other suitable refractory material, it is possible to eliminate the risk of iron pick-up and many kinds of aluminium alloys can accordingly be used. The adaptability of the pressure-die-casting system to the rapid production of castings of consistent quality has led to an extraordinary development of the process, particularly since 1934 and even wider scope for the improvement of this method can be foreseen for the future, particularly where designers are prepared to co-operate with the producers. The castings can be produced as finished, or near-finished articles; that is to say, the purchaser will have little or no machining or finishing to perform. The production rate for pressure-die-casting is high—probably in excess of the rate of machining operations that the system can eliminate—and dimensional accuracy compares favourably with general machine-shop practice. The four most-popular alloys for use with the pressure-die-casting system are LM.2.M., LM.4.M., LM.5.M. and LM.6.M., all to specification BS.1490.

Other Special Alloys

Certain of the improved alloys which came into existence during the period up to 1930 have already been touched upon and it would be rather a laborious job to attempt to go through all the new alloys which have come into general use from that date up to the present time. The main efforts had the one idea in view, namely, to produce alloys which were reasonable to handle in the foundry and which offered improved mechanical properties to enable the industry to keep in step with the demands which were continually being made by the designer for producing materials which would afford

FIG. 2. — *Filling the Header Trough and Running the Vacuum Filter Casing. Subsequently, the additional Ingate Plugs were withdrawn. In the Foreground, a Run-off Pot has been prepared.*

lightness in structure and adequate strength for the higher-stressed applications. Mention must accordingly be made of two alloys which, on their introduction, did mark a very big step forward in this direction, the first being an aluminium/copper alloy containing between 4 and 5 per cent. copper, with all impurities kept down to a minimum and which is best known under the specifications D.T.D. 298 and D.T.D. 304. The second, which has proved more popular in the industry, is an aluminium/magnesium alloy, with a nominal magnesium content of 10 per cent., again with a very strict control on all impurities. This has been known from its first introduction as D.T.D. 300 and a very large number of highly-stressed castings have been produced in it. Both alloys require special foundry technique and heat-treatment, but, where they are used with proper technical control, excellent results have been obtained.

D.T.D. 424

While on the subject of alloys of more recent development, mention must be made of one alloy which was developed by the late Percy Pritchard, shortly before the outbreak of the last war in 1939, namely, D.T.D. 424. As, however, the Author was privileged to present a Paper dealing with this alloy specifically at the annual meeting of the Institute of British Foundrymen at Newcastle-upon-Tyne*, only brief reference is made to it on this occasion. It is an aluminium/silicon/copper alloy, containing approximately 5 per cent. silicon and 3 per cent. copper, the main point being that it is the first official aircraft specification designed to use all secondary metal. It was drawn up at the outbreak of the war at the request of the Ministry of Aircraft Production as they had expressed the desire to have a useful secondary-alloy specification, which could be used for many aircraft engine and airframe castings, and which were subject to moderate stress only, in order to save much valuable virgin aluminium ingot.

In the Paper already referred to, the author referred to this as the versatile light alloy and even a brief study of the service which this alloy has rendered will justify the title. The alloy is also covered by general engineering specification BS. 1490 alloy LM4 and while both the D.T.D. and the BS specifications call for this material to be supplied in the " as cast " condition, many applications of the alloy concern its use after it has been subject to various heat-treatments, thereby considerably increasing its field of application on account of the improved mechanical properties which can be obtained both in proof stress, ultimate tensile strength and elongation.

Radiological Examination

In making reference to the improvements within the foundry due to technical control, both in the handling of the metal and improvements in foundry technique, no mention has been made of the assistance that has been rendered in this direction by the use of radiological examination of castings. This method of inspection of the early sample from various new projects has enabled the practical foundryman to modify and correct his technique and to check back and see clearly what improvements these modifications have produced.

Incidentally, it may be of some interest to relate a little story of the early days of attempts to obtain radiographs of aluminium castings. These early experiments were made, in about 1917, by one of the pioneers of X-rays, namely, Dr. Hall-Edwards, of Birmingham, who sacrificed his life for what was at that time a new branch of medical science. The present Author had the privilege of taking down to the doctor's consulting rooms a number of aluminium piston castings, which were then being made for the aircraft industry. These were carefully laid on the couch which was usually used by a human patient, and a number of efforts were made to obtain a reasonable negative which eventually led to success. These experiments were watched with considerable interest by Professor F. C. Lee, and are believed to be the very first efforts to obtain radiographic records of aluminium castings.

Skilled Methods

From the foregoing remarks, it could be assumed that with the advent of mechanical aids in the

* Published in the JOURNAL, July 26, 1951.

FIG. 3.—*Removing the Consolidating Sand from the Moulding Pit preparatory to Removing the Vacuum Filter Casing.*

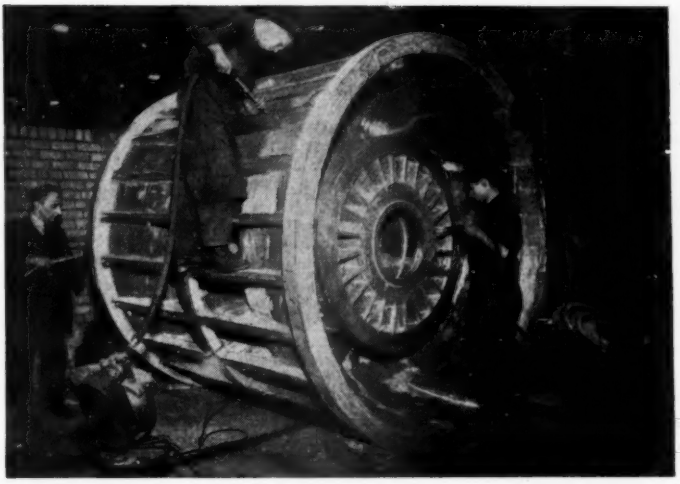


FIG. 4.—*Fettling the Rotary Vacuum Filter Casing in Aluminium Alloy D.T.D.* 424. *As-cast Weight* 10,800 *lb.*

foundry, the necessity for the skilled craftsmen was being rapidly removed. Such, however, is definitely not the case, and while it is regretted that few young men are coming forward to replace the older craftsmen, the industry is proud of the fact that there is still a certain number of skilled men who can tackle any complicated or intricate foundry problem when it arises. One particular case was the production of what is considered to be at least one of the largest castings in aluminium alloy that has been produced. This was the body for a rotary vacuum filter casing, the size of which can be judged from Figs. 1 to 4, which show stages in the manufacture. The outside diameter of the casting is 7 ft. 9 in. and the height 7 ft., and it contains a complicated series of ports and channels. The pattern was fully segmented and complete in itself so that no strickles were employed. Full advantage was taken of existing patternmaking machinery by producing the pattern in twelve sections, which were bolted together into four units for ease of transport and handling. Nearly four standards of timber were used in the production of pattern and coreboxes.

Moulding the Vacuum Filter Casing

The moulding box was made in four sections, three comprising the drag and one the cope. Owing to the height of the casting, the mould was rammed up in a pit of such a depth that when pouring the casting the top of the mould was at a convenient height from the foundry floor. The bottom section of the drag had four steel channel sections bolted on to form a base on which to fasten the cores securely. This section was carefully levelled and the pattern bedded therein with great care to ensure that it was vertical, this being essential for ease and accuracy of assembly of cores and mould. The remainder of the mould was then rammed up.

In assembling the mould and cores, after the pattern had been withdrawn and the mould surface finished and dried, the first main body-core, which was approximately 3½ tons in weight, was located and set in the base of the mould. The setting of this core was of extreme importance since in its construction 24 metal cups had been accurately positioned therein to form the internal location for the radial cores which produced the ports. These radial cores, which were made in silica sand, were each located by means of a metal dowel in the 24 cups in the main core, with an additional location at the outside periphery, at the top and bottom of the mould respectively. Four additional main body-cores, all produced in natural-bonded sand, were assembled to form the centre profile, and these were eventually held down by four long bolts, which passed through the base core to the steel channels referred to earlier. This was considered essential to avoid a possibility of lift or movement during the pouring process.

Closing and Pouring

The top moulding box was next placed in position, and two large git-boxes were arranged on opposite ends of the mould, each covering two downgates, the two boxes having a total capacity of 12,000 lb. (5.4 tons), which was actually sufficient to run the casting. In the base of these boxes, metal cups and plugs were inserted, each immediately above one of the downgates, thus preventing the flow of any metal into the mould until desired.

Not least of the problems in producing a casting of this type and size were those of maintaining a sufficient head of metal for feeding purposes and a careful control of the metal temperature. The metal was melted in a 6-ton reverberatory furnace and was tapped into two geared ladles simultaneously. From these, the two git-boxes, or bushes, were filled, the stops preventing any metal reaching the mould. The large ladles were then replaced by two smaller ones carrying reserve of metal in case of necessity, and also to provide an adequate supply of feed metal for the open-ring riser on the top of the casting.

When the metal in the runner boxes was at the correct temperature, the four stops were withdrawn and the mould allowed to fill. The actual time taken to fill the mould was two minutes, and the metal temperature at the time of casting was 700 deg. C. As one would expect, extensive chilling was applied where rapid changes in metal sections occurred. The total weight of the vacuum filter casting as cast was 10,800 lb. and the weight of the

(*Concluded on page* 228 *at the foot of col.* 1)

Publications Received

Bulletin of the British Cast Iron Research Association, Vol. 11, No. 4.

This issue announces the appointment of Mr. T. E. Whiteside as Secretary of the Association. Up to now this position was held by the Director, but with the expansion of the work of the Association, Dr. Pearce needed some relief. There is a full report of the annual general meeting. For the balance, there are the usual features of Book Reviews, Abstracts and library additions.

Founded on Fact, by Basil H. Tripp. Published by the Council of Ironfoundry Associations, 14 Pall Mall, London, S.W.1.

This 45-page booklet is a well-written account of just what the ironfoundry industry is and does. Because it is the first piece of publicity got out by the C.F.A. addressed to the general public, it assumes special importance. The description given of the industry has embraced all the major activities, ranging from production to recruitment. When technology has been introduced, the use of plain, readable English has made the descriptions easy of assimilation by the layman. If it be desirable, as most certainly it is, to differentiate between iron founding and iron and steel making, the work of the latter industry might have been given more prominence. Whilst the type of illustrations used—bordering on the grotesque—may be applauded by some, they happen to be nauseating to others, which include the reviewer. However, a start has to be made, and no better choice of Author could have been found than Mr. Tripp; he has done exceptionally well.

Education for Management. A Report published by the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1. Price 4s. 6d. (post free).

One can suppose it is a matter of both interest and urgency that the British should familiarise themselves with the American system of education which has contributed so largely to the States' leading position as high-productivity manufacturers. The subject was dealt with in some detail in the "Ironfounders' Report," the leader of which was Mr. S. H. Russell, who is very knowledgeable on the subject. Whether this new Report adds anything of material interest to our readers is difficult to state, but unquestionably it is of outstanding importance to the educational authorities. This is stressed in paragraph 12 of the "Findings," which states that "As no comprehensive study of what is being done to teach administrative students in universities and technical colleges in Britain has been compiled, such a study should, in the opinion of the Team, be undertaken as a matter of urgency." Why the example set by the "Ironfounders" was not emulated, it is difficult to imagine in view of the earliest criticisms of the Anglo-American Council on Productivity's team work.

History of Aluminium-alloy Casting

(*Continued from previous page*)

finished job 7,207 lb. Sand used in the production of the mould, cores, etc., was approximately 51¼ tons.

In conclusion, the Author expresses his thanks to the directors of the Birmingham Aluminium Casting (1903) Company, Limited, for permission to publish this Paper, and to his colleagues for their ready assistance in the preparation of the illustrations.

More Management Courses

Presiding at a conference arranged by the Faculty of Commerce and Social Science of Birmingham University on February 16, when the topic for discussion was "Education for Business Management," Sir Arthur Smout, president of the Birmingham Chamber of Commerce, said that a much broader basis of education than the old technologies to which we have hitherto pinned our faith, is essential if Britain's industrial ailments are to be cured. Comparing American methods, he said that over 250,000 students are attending business courses at university level in U.S.A. and by contrast the provision made in Britain is small, while, in many important centres of industry, no provision of any kind exists.

Tied Down

Restrictions we must have, he said, without them society could not hold together. With world conditions as they are to-day they have necessarily become extended in the realms of trade and industry. But there comes a time when, like Gulliver, one wakes up to find oneself tied down by a ponderous and intricate system, and the wriggle for freedom begins. He challenged the Government to "root out the wicked waste and inefficiency in its own departments, and end the form-filling and kowtowing to minor officials." In recent years, he said, industry had been taunted, teased, harried, and lampooned, chiefly by people who have never been "trusted to manage a huckster's shop." "This much maligned industry," said Sir Arthur, "has played a major part in post-war recovery, and it is time someone said so in plain Churchillian English."

Sir Hugh Chance, speaking at the same meeting, stressed that lessons are to be learned from Sweden and Switzerland, as well as from America, and Professor W. H. Cowley of Leland Stanford University, California, told the assembly that Britain has lagged behind U.S.A. in training men skilled in merchandizing. He pleaded for a good, general, liberal education to facilitate communication between various grades in industry.

Appeal for a Foundry Succeeds

Mr. W. L. Proctor, metallurgist, is to be allowed for a period of three years to use a building in Hayseech Road, Halesowen, as a foundry for the manufacture of die-castings. A condition is that a baffle chamber and spark arrestor are installed.

Permission was refused by Halesowen Town Council, acting on behalf of the Worcestershire County Council, which is giving particular attention to the relocating of badly-sited industries at Halesowen. Mr. Proctor appealed and a local inquiry was conducted by an Inspector of the Ministry of Housing and Local Government. Mr. Proctor stated that he was engaged in small-scale experiments and if they succeeded he proposed to move to other premises in an area zoned for heavy industry.

Announcing his decision, the Minister says he agrees with the Council that it would be wrong to permit the development of the site as a permanent foundry, but he considers that with suitable safeguards this experimental plant might be allowed for a short period without appreciably affecting the surroundings or the further development of the area.

THE *Association Technique de Fonderie* announces that the 25th Congress will be held in Lille from May 19 to 21.

Cross-section of a Non-ferrous Jobbing Foundry

By J. Gorman

(*Continued from page* 199)

Architectural Casting

Whilst architectural castings are admittedly the exception rather than the rule in foundry practice and may be of very little commercial value to the industry, it would be an occasion for some regret if, even in these difficult times, such castings should disappear entirely from the foundry. Even a nominal break from austerity is something to be appreciated and is always a matter for added interest. A recent issue of the FOUNDRY TRADE JOURNAL carried a leading article under the heading "Added Interest," expressing the view that the introduction of some small art casting in the apprentices' curriculum would stimulate interest and love of craftsmanship, an objective well worthy of consideration.

As has been remarked earlier, the Author's initial aim in choosing the title for this Paper was solely the desire to demonstrate the versatility of the jobbing foundry, and if the introduction of a small art casting can be a matter for "added interest" to someone, then it may have been well worth while, and Fig. 37 shows a number of architectural castings made under these conditions. Included in the picture are two small busts made by the "lost-wax" process, the history of which process is as ancient as its modern application is in its infancy, yet which in its relation to statuary work has changed very little through the ages. A recent bust made is that of Mr. Churchill, and Fig. 38 shows the model provided. It is a fine example of the modeller's art and as such it is the foundryman's job to reproduce in bronze its character and detail.

Generally the model takes the form of a plaster cast and the foundry's first consideration, if it has been decided to use the lost-wax process, is by what medium it is intended to obtain the wax duplicate or pattern, the chosen means being open to selection from a variety of methods, such as by a plaster of Paris loose-piece mould; a flexible mould; or, as in this particular instance, a combination of both. This method was possible owing to the absence of detail or undercuts on the back portion of the model.

Preparing the Mould Parts

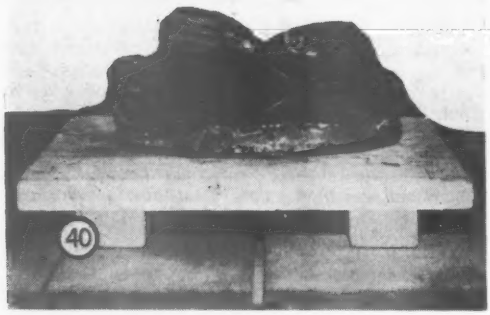
The work was started by bedding the model face downwards in sand (Fig. 39) to a predetermined joint line; the surface was then oiled and plaster of Paris was spread over it to a fair thickness and allowed to set. The model was then removed from the plaster cast and the latter was trimmed, locating points for the other half-mould were formed, and the plaster was given two or three thin coats of shellac. The plaster cast was then placed joint-face upwards and the model was placed in it. Fig. 40 shows the model, face upwards in the plaster-of-paris back portion of the mould. A blanket of modelling

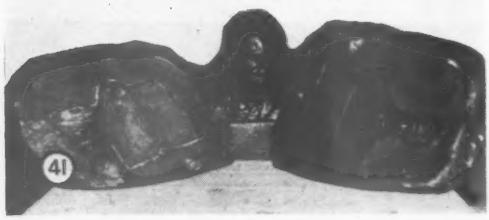
FIG. 37.—*Selection of Art Castings made in the Greenock Foundry.*

FIG. 38.—*Model from which the Bust of Mr. Churchill was Cast.*

Cross-section of a Non-ferrous Jobbing Foundry

clay was then prepared, having a thickness of, say, about ½ in. and spread over the whole face of the model. Plaster of paris was spread over the clay, in the same manner as on the back section and, when set, this part of the plaster cast was taken off and the clay removed. This plaster half cast was then





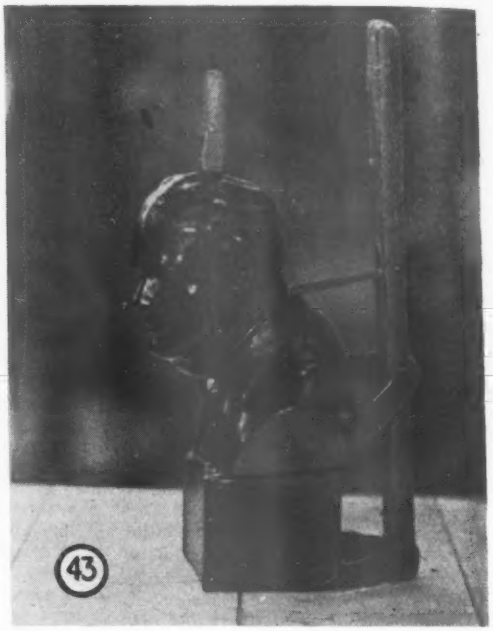


FIG. 39.—*Model of the Churchill Bust embedded Face-down in Sand.*

FIG. 40.—*Model, Face Uppermost, on its Plaster Back-piece.*

FIG. 41.—*Gelatine Negative (right), Model (centre) and Plaster Back-piece (left) for the Churchill Bust.*

FIG. 42.—*Wax Positive of the Model being removed from the Gelatine.*

FIG. 43.—*Wax Model Assembled with its Runners and Risers.*

FIG. 44.—*Completed Investment containing the Wax Model after removing the Box Sides.*

shellac-ed and oiled and returned to its original position, being located on dowels or locating points, which had been originally prepared in the back-section. The assembled mould now consisted of the back-section with the model fitting snugly into it and an outer or retaining casing with a cavity between it and the face of the model where the clay had formerly been. A hole was cut at a convenient point on the casing and through this a quantity of gelatine was poured, completely filling the cavity. Fig. 41 (right) shows the completed casing with the gelatine.

Preparing the Wax Positive

When the gelatine had set, the mould was split and the model removed. Art foundry gelatine is a flexible material and can be easily stripped off the face of a model, as it can be stretched to pass any undercuts such as may occur in the general contour, such as nostrils, ears, etc. In this case, the gelatine was then placed in the retaining shell or casing and, when the two halves of the mould were again re-assembled, it gave an exact mould or negative of the model, the back portion in plaster of Paris and the face portion in flexible gelatine, in a plaster-of-Paris retaining casing. Before this re-assembling, all the parts of the mould were oiled, care being taken to ensure that no excess oil remained which might have obscured the detail of the subject. A calculated quantity of pattern wax was melted and poured into the mould and the mould then turned through a series of angles until the wax solidified on the mould surface to an approximate thickness of $\frac{1}{32}$ in. Fig. 42 shows the wax model being removed from the gelatine. When the wax had cooled, the mould was split and the wax removed—a replica of the original model. Any touching-up was then carried out and all traces of joint removed, obviously much more easily accomplished at this stage than on the finished bronze casting.

Investment

The next job was to enclose the wax in an investment material, this being the term applied to the refractory or mould material used in this process. First, however, a gating system was made of wax and attached to the wax model by means of a hot spatula; the whole is shown in Fig. 43. This assembly was placed into a suitable container and the investment material, in the form of a slurry, was poured over the wax and vibrated for a few minutes to eliminate any air bubbles. When the investment had set, the mould was turned upside down and the internal cavity in the wax was filled in a similar manner, three wax sprues being provided on the base to allow the melting wax to flow out. Fig. 44 shows the completed investment.

Firing and Casting

The mould was then returned to the upright positoin and placed in the core-stove for firing. No reinforcing irons of any kind were used. The only precaution taken was to sink five brass nails through the wax and leave them projecting internally and

FIG. 45.—*Casting of the Churchill Bust as removed from the Mould and prior to Casting.*

externally. These acted as steadiers to the core when the wax was melted out.

Stoving was carried out with moderation, using the normal foundry facilities; the mould was brought up slowly to 195 deg. C. in the core-stove to eliminate the wax and was held overnight to dry out. Subsequently the whole was stoved overnight at 395 deg. C. in the mould stove and cast the following morning while it was still hot. Preparatory to casting, the wax outlets on the base were sealed and the mould rammed in a suitable frame as a precaution against its bursting. The material used was a fairly soft architectural bronze, 84/3/3/10, and Fig. 45 shows casting prior to fettling. While the bust was still far removed from the finished article, after the careful removal of gates and any fine veins or fins, the casting was handed over, free from defects and true in detail, to more capable hands for final finishing. The foundry craftsman could then feel his obligations fulfilled, his task well done.

Acknowledgment

In conclusion, the Author would like to express his thanks to the directors of Barr & Company (Brassfounders), Limited, and John Hastie & Company, Limited, Greenock, for their ready permission and encouragement to present this Paper and to all members of the staff for their most helpful co-operation. He also expresses his appreciation to one of the Institute's members, Mr. Anderson, of Scott's Shipbuilding & Engineering Company, Limited, for his contribution by way of photographs and slides.

Notes from the Branches

Tees-side

The Tees-side branch of the Institute of British Foundrymen held a well-attended meeting on February 8. The president (Mr. E. H. Marshall) opened the meeting by asking the members to observe a two-minute silence as a mark of respect to the late King. He then announced that the branch Council had agreed to change the date of the visit to Darlington Forge Works from Friday, March 14, to Tuesday, March 11. This change had been made because on that evening the works would be working full time due to the staggering of hours. Detailed arrangements would be sent to all.

The Paper given at this meeting was "Heavy Steel Castings," and the lecturer Mr. A. P. Riley, whose firm, Darlington Forge, has been responsible for some of the largest steel castings ever produced.

MR. RILEY said that he felt that the field of steel castings had been very much neglected. It was not his intention to tell anyone how to make steel castings, but rather to describe the difficulties and problems involved in the production of extremely large castings and how these could be overcome, and the ways and means of obtaining a reasonable product at the end. The lecturer explained that by large castings he meant those of from 30 to 50 tons in weight. Not many firms were equipped to tackle such large jobs. Slides were then shown so that members might have an indication of the type and size of casting Mr. Riley had in mind. Not all large castings, Mr. Riley said, were heavy, but some of them were very unwieldy. One of the first requirements was suitable crane capacity—the cranes should have an adequate reserve of power and be equipped to deal with a much greater load than the weight of the casting. Furnace capacity was important, as was the size of the annealing furnaces. The shops must be large and roomy with plenty of head-room, and facilities should be available for moving jobs from one place to another. Cores, too, were something of a problem, as these could on occasions weigh from 4 to 5 tons.

Risks

Mr. Riley said there was a certain amount of risk attached to the making of large castings as, if one was spoiled, it meant a very serious loss of both time and material. He warned that it was necessary to take precautions against damp and wet, and also said that if special moulding pits had to be made, a further heavy charge was incurred on the job. Fettling also cost much money and it was wise to see that the need for this was reduced to the minimum. Founders, however, were in a better position nowadays, for engineers were open to suggestions when seeking quotations for the job.

Mr. Riley's lecture was well illustrated with slides which showed the means adopted by his firm to overcome the difficulties which arose when large and intricate castings were undertaken for customers.

Mr. Dowson, junior vice-president of the branch, closed the meeting with a vote of thanks for the lecture, which had been most interesting.

THE COUNCIL FOR CODES OF PRACTICE FOR BUILDINGS has now issued in final form Code 231, "Painting." It was drawn up by a committee convened on behalf of the council by the Royal Institute of British Architects. The code relates to the painting of buildings for the purposes of decoration, protection or hygiene, and includes a head code dealing with general considerations and sub-codes on particular aspects of painting wood, iron and steel, non-ferrous metals, concrete, etc.

Fewer Students

Reference to the fall in the number of students attending the Royal Technical College, Glasgow, was made on February 14 at a meeting of the Board of Governors. Dr. David S. Anderson, who submitted the annual report for 1950-51, drew attention to the diminution in the number of students attending college during the year. The decrease, he explained, was largely due to the fact that 400 students attending night school classes had been transferred to the education authorities. That situation, he said, was not to be regretted, for it merely meant they had passed from the stage of being seriously overcrowded to being just overcrowded.

The fall was also due to a decrease in the number of ex-Servicemen entering the college. That factor was also not to be regretted, for a great many Servicemen had come to the college with a Government grant and supplied with the necessary qualifications, but had not had the staying powers. Dr. Anderson expressed satisfaction with the employment situation for students leaving the college, and stated that every student completing his course was receiving the offer of two or three jobs. That indicated that industry was very far from saturation level as far as employment was concerned.

F.B.I.'s Views on Taxation

The suggestion of the Committee on the Taxation of Trading Profits, contained in its report published last April, that the liability to tax should depend upon the judgment of the Treasury of the importance of the industry to the national economy, was stated by the Federation of British Industries last week to offend an elementary principle of taxation. Tax should be determined by the amount of income or profits, and not by estimation of the importance of the activities from which they arise. Deduction to be made for the utilization of certain fixed assets, or for stocks used up during the year, should represent a due proportion of their value.

Provisions in the accounts of many industrial concerns to provide funds for the replacement of plant were not being allowed as deductions in the tax assessments. In the case of fixed assets, additional allowances should be quite distinct from normal wear and tear allowances, and the spreading of income recommended for surtax purposes should be extended to all forms of earned income.

Glasgow Moulder Burned

An award of £310 15s. was made by a jury sitting with Lord Mackintosh in the Court of Session on February 15, to John McKinnon, moulder, of Glasgow, in an action in which he sued J. & T. Boyd, Limited, iron-founders, Shettleston Ironworks, Glasgow, for £1,000 damages in respect of burning injuries and shock sustained at their works in 1949.

McKinnon was making castings when a moulding box, made by defendants, and into which molten metal was poured, burst open and the metal poured over his left foot. He averred that defendants failed to provide moulding boxes fit to be used for the process. The defendants, who denied liability, attributed the accident to McKinnon, contending that if the box was cracked, which they denied, it was his duty to report the matter and not to use the box. He also failed to ensure that the box was properly closed. The jury assessed total damages at £565, and apportioned 55 per cent. blame on the defendants and 45 per cent. on the claimant.

National Foundry Craft Training Centre

It is gratifying to report that very considerable interest is being evinced in the Centre. In recent months representatives have visited the Centre from the Ministry of Supply: the Industrial Educational Officer; the president of the National Union of Foundry Workers; the manager of the various foundries at the Royal Arsenal, Woolwich, as well as a number of foundry executives. In every case they have expressed complete satisfaction with regard to the facilities and skilled instruction they have seen being imparted to the youths and have also been loud in their praises of the excellent accommodation at the residential club and the arrangements made for the youths for study and to enjoy the cultural and entertainment facilities provided.

It is interesting to report that some firms have sent from four to eight boys, and in one of the forthcoming courses there are four and three boys from two firms. There have recently been so many applications for the first courses commencing on April 16 and September 15 that at a recent management committee meeting it was decided to introduce an additional first course commencing on August 11 in place of the fourth course which had been tentatively arranged for that period.

The City and Guilds of London Institute has now recognized attendance at the Centre during the respective courses as equivalent to the youths' attendances at technical colleges or evening classes. The lads are not, therefore, prejudiced by attending at the Centre whilst their classes are functioning. This is really very important, as it has been found that several firms reported they could not send their lads to the Centre as they would lose their attendance marks at the classes, which would prejudice their sitting for the City and Guilds examinations.

During 1949, 89 youths attended the Centre, in 1950 a similar number attended, and last year the number had risen to 94. As things are shaping this year, there should be well over 100. This improvement must be largely credited to Mr. Roper, the instructor, who is exceptional not only because of his skill in the craft, but also because of his marked ability to teach and get the best out of the lads. He is also a lecturer in foundry practice at the National Foundry College at Wolverhampton, which makes him pre-eminently suitable from all angles. The Warden and his wife also have a wonderful way with the lads and many of the letters received from apprentices pay tribute to their parental attitude at the club in making them feel happy during their residence. The Warden also supervizes the lads' studies in the evenings—three nights per week for 1½ hours each night. Their studies are from notes prepared by the instructor and follow the skilled instruction given by him during the day.

There are still some vacancies and, as the courses are now obviously being more widely recognized as part of the youths' essential training, early application should be made to the honorary secretary, National Foundry Craft Training Centre, 117, Church Lane, Handsworth Wood, Birmingham, 20. The courses for which a few vacancies are available are as follow:—Term 37, third course, commencing May 19, 1952; Term 39, first course, commencing August 11, 1952; Term 42, third course, commencing November 24, 1952.

Home-grown Linseed—THE MINISTER OF FOOD announces that a minimum price of £65 a ton ex farm will be paid for home-grown linseed of 90 per cent. purity offered to, and accepted by, the Ministry during the period July 1, 1952, to March 31, 1953.

British Rollmakers' Corporation Proposals

Provided the necessary resolutions are passed by shareholders at an extraordinary meeting called for March 10, the capital of the British Rollmakers' Corporation, Limited, is to be increased to £1,500,000 by the creation of 400,000 ordinary £1 shares. The new capital is required for the purpose of acquiring the 100,000 issued £1 shares of Miller & Company, Limited, Edinburgh, which will require 140,000 of the new shares, and for a two-for-three capital bonus, which will absorb the remainder of the new shares plus 80,432 shares already in existence but unissued.

Miller & Company is a private company engaged chiefly in the manufacture of rolls which the corporation has never been actively engaged in making. The share issue is subject to Treasury consent being obtained.

More Steel for Toolmaking

Better supplies of steel for toolmaking were promised by Mr. Duncan Sandys, the Minister of Supply, when he addressed the Gauge and Toolmakers' Association last week. Firms engaged in the industry, he said, would shortly be receiving notice of allocations for the second period, and he thought they would find that, taking the industry as a whole, they were going to have a substantial overall increase, within which there would be a very much higher proportion of alloy steel.

Rubber Conveyor and Elevator Belting

A revision of B.S.490, "Rubber Conveyor and Elevator Belting," has recently been issued by the British Standards Institution. B.S.490 was originally published in 1933 and was revised as a war emergency edition in 1943. The new document reverts, to a great extent, to the original standard of 1933, but now has five weights of fabric as well as three grades of rubber cover. The standard also gives details regarding the construction of the belting as well as stipulating limits for defects, tolerance, strength of fabric, and adhesion. Methods of test are given in the appendices, where information is also contained regarding suggestions for the selection of belting; the appendices also contain recommendations with regard to service conditions. In view of the present shortage of cotton, an amendment slip is being published simultaneously with the document, temporarily relaxing the strength of the fabric by 5 per cent. Copies of this standard may be obtained from the British Standards Institution, 24, Victoria Street, London, S.W.1 (price 3s. by post).

HALL, RUSSELL & COMPANY, LIMITED, Aberdeen, has received an order for two motor cargo vessels of about 5,000 tons dw. from Silvertown Services, Limited, London. The vessels will be used to transport raw sugar from the West Indies to London. The propelling machinery will be supplied by British Polar Engines, Limited, Glasgow.

LABORATORIES which would enable research to be carried out under steelworks production conditions were nearly complete in Sheffield, stated Mr. W. C. F. Hessenberg, head of the mechanical working division of the British Iron and Steel Research Association in the city recently. Equipment which will be installed soon includes a 14-in. four-high cold strip rolling mill, a high-speed wire drawing machine, and a forging press.

Obituary

MR. ISAAC NEWBOLD, employed at the foundry of the Beeston Boiler Company, Limited, for 47 years, has died aged 71. He was a former secretary for the Company's sick club, and holiday club.

MR. W. L. CANTRILL, a consultant on refrigeration work, has died at 84. In 1884, he joined the Haslam Foundry & Engineering Company, Limited, Derby, and later was in charge of the refrigeration installations carried out by the firm. Some time afterwards he became commercial representative and head of the estimating office. In 1929 he became a refrigeration consultant. Mr. Cantrill was a member of the Institution of Mechanical Engineers, and also a member of the Derby Society of Engineers.

WE REGRET to announce the death of LT.-COL. A. H. GUY, who died in South Africa on December 15. He was for twenty years connected with the gold-mining industry. In 1926 he joined Eclipse Tube Mill Liners, Limited (later Eclipse Engineers, Limited). After a few years, the steel foundry of Cornthwaite & Jane (1938), Limited, was acquired. After a visit to this country in 1932, he returned and with others founded the South African branch of the Institute of British Foundrymen, and was its first president. His interest in the Institute has been continuous since that time. During the last war he was president of the South African Red Cross Society, and also honorary colonel of the 3rd Battalion of the Transvaal Scottish. He retired from active business about two years ago.

Recent Wills

DAVIES, R. J., former commercial manager with Imperial Chemical Industries, Limited, at Grangemouth £9,052

MCKAY, R. F., late manager of the inventions and patents department of the Dunlop Rubber Company, Limited £2,656

MILLS, J. G., a former director of Gjers, Mills & Company, Limited, pig-iron manufacturers, of Middlesbrough £18,356

WALKER, E. W., a director and secretary of Gibbons (Dudley), Limited, gas retort manufacturers, etc., and Gibbons Bros., Limited £7,827

HUTCHISON, LIEUT.-COL. C. G. G., late a director of Fawcett Preston & Company, Limited, sugar machinery manufacturers, of Wirral (Ches) ... £57,491

HOWE, H. A., works metallurgist of Firth-Vickers Stainless Steels, Limited, Sheffield, since 1934, and previously with Thos. Firth & John Brown, Limited £4,349

FRANK, SIR THOMAS PEIRSON, formerly chief engineer and county surveyor to the London County Council, who was president of the Institution of Civil Engineers in 1945 ... ... £32,772

JAMES, P. A., vice-chairman of the Wolverhampton Metal Company, Limited, and James Bridge Copper Works, Limited, Walsall, and a director of Joshua Bigwood & Son, Limited, Wolverhampton £140,871

PARKER, W. B., former consultant chemist and metallurgist to the British Thomson-Houston Company, Limited, and who had conducted numerous researches on insulating oils, lubricating oils, shellac, mica, etc. £7,407

NEWMAN, CHARLES PERCY, a Fellow and vice-president of the Institution of Works Managers, a member of the Council of the British Engineers Association and of the Grand Council of the Federation of British Industries, chairman of Newman Henders, Limited £10,108

EVANS, HERBERT, formerly manager of Richard Thomas & Baldwins, Limited, at Llanelly, with which he served for 44 years. He was a member of the Swansea and District Metallurgical Society, and the Steel Federation Joint Board for the West Wales Steel Section £11,071

TO ASSIST FOREIGN BUYERS in planning their visits to the 1952 British Industries Fair, advance consignments of catalogues have been flown overseas.

Personal

MR. W. G. KEFFORD, previously London manager of W. T. Glover & Company, Limited, cable manufacturers, etc., of Manchester, has become a partner in Ferguson & Palmer, engineers' agents and contractors, of London.

MR. H. R. GARTH, who joined the North Eastern Railway at York in 1908 and was assistant civil engineer, North Eastern Region, British Railways, retired on February 21. He trained at the Bradford Technical College for four years, and during the 1914-18 war was an officer in the Royal Engineers.

LORD BRAINTREE, chairman of the Crittall Manufacturing Company, Limited, metal window manufacturers, of Braintree (Essex), and of Darlington & Simpson Rolling Mills, Limited, has been reappointed to the Court of the Bank of England, under the Bank of England Act, 1946, for a period of four years as from March 1, 1952.

DR. H. ROXBEE COX has been presented with the James Clayton Prize, amounting to £1,550, of the Institution of Mechanical Engineers, for his contributions to engineering science and practice. Chief scientist to the Ministry of Fuel and Power since 1948, Dr. Roxbee Cox, who is a past-president of the Royal Aeronautical Society, was for many years engaged in aeronautical scientific and engineering research.

MR. A. G. K. PARKER has joined the board of F. H. Wheeler & Company, Limited, and has been appointed managing director. Before taking up his new appointment, Mr. Parker was associated with the companies within the E.M.I. group for 24 years, and for the past 10 years has been works engineer of E.M.I. Factories, Limited, Hayes (Mddx). He received his engineering training with the Brush Electrical Engineering Company, Limited, and at Loughborough College.

Increases of Capital

The following companies are among those which have recently announced details of capital increases:—

PAISLEY BRASS WORKS COMPANY, LIMITED, increased by £25,000, in £1 ordinary shares, beyond the registered capital of £15,000.

ALEXR. McKAY, LIMITED, engineers' furnishers, of Aberdeen, increased by £18,000, in £1 shares, beyond the registered capital of £2,000.

ALEXANDER SHANKS & SON, LIMITED, engineers, etc., of Arbroath, increased by £45,000, in £1 ordinary shares, beyond the registered capital of £55,000.

COCHRAN & COMPANY (ANNAN), LIMITED, boilermakers, of Dumfries, increased by £100,000, in 5s. shares, beyond the registered capital of £200,000.

ACRU ELECTRIC TOOL MANUFACTURING COMPANY, LIMITED, Manchester, increased by £4,900, in £1 ordinary shares, beyond the registered capital of £100.

THOMAS MILLINGTON & COMPANY, LIMITED, metal merchants, of Birmingham, increased by £15,000, in £1 ordinary shares, beyond the registered capital of £15,000.

DESIGNEX (COVENTRY), LIMITED, tool, pattern, and machinery designers, etc., increased by £8,000, in £1 ordinary shares, beyond the registered capital of £5,000.

ATLAS STEEL FOUNDRY & ENGINEERING COMPANY, LIMITED, Armadale (West Lothian), increased by £100,000, in £1 shares, beyond the registered capital of £75,000.

DAVID BENTLEY (LEICESTER), LIMITED, engineers and mill furnishers, etc., increased by £5,000, in £1 unclassified shares of £1 each, beyond the registered capital of £15,000.

LEWIS & HOLE, LIMITED, non-ferrous founders, etc., of Brimscombe, near Stroud (Glos), increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

W. D. CARROLL, LIMITED, manufacturers of forgings, castings, plates, etc., of London, W.3, increased by £6,000, in £1 ordinary shares, beyond the registered capital of £1,500.

ARMSTRONG WHITWORTH & COMPANY (PNEUMATIC TOOLS), LIMITED, Gateshead-on-Tyne, increased by £15,500, in £1 ordinary shares, beyond the registered capital of £50,000.

H. & E. ENGINEERS, LIMITED, Oxford, increased by £17,000, in 7,000 ordinary and 10,000 redeemable preference shares of £1 each, beyond the registered capital of £3,000.

Claim from Scots Foundry

An accident at a Leven foundry on January 18 last year, in which a workman was injured, resulted in a £2,000 claim at the Court of Session on February 14. John Blair claimed that sum from Henry Balfour & Company, Limited, engineers and boilermakers, Durie Foundry, Leven. In the accident Blair lost part of the flesh of his left hand.

Blair maintained the accident was caused through the fault and negligence of a crane driver. The firm denied responsibility. In evidence, Blair stated that he had been employed as a slinger and rope splicer for about two years. On the morning of the accident he was preparing the slings for a large tank prior to it being lifted on to a bogie. He was at the centre of the tank, where he was on the blind side of the crane driver, whose cabin was about 18 ft. above the ground. He saw a kink on one of the slings and cleared it. Both slings then started to take tension. Blair denied giving the craneman any signal to go ahead. He immediately spread the slings, pushing them apart with the balls of this thumbs in the usual way. As the tank was being hoisted the ball of his thumb was caught in the rope, and part of it torn out.

He was now employed in a bakehouse and his wage was 30s. a week lower than he got as a slinger. Robert Brown, a truck driver with two years' experience of slinging, said he hadn't seen Blair give any signal. The accident happened when the tank was about a foot off the ground. James W. Anderson, another witness, said he had been a craneman for 31 years. Blair had signalled to him to take up the hook. He then ran round the back and Anderson continued to take up the slack at a snail's pace. When he had finished Blair came running out from behind the tank holding his wrist. It was not true to say the tank had been lifted from the ground. Cross-examined by Mr. Shaw, he said he always waited for a signal from the slinger before putting on tension, and on this occasion he didn't raise the tank from the ground. Alex. Wilson (53) of Leven, foreman, said he was positive that the tank never left the ground. Accident took place when the strain was being taken.

The jury found Blair had failed to prove his case. Summing up, Lord Guthrie said Blair was only entitled to damages if he proved that the craneman was negligent.

Latest Foundry Statistics

According to the February Bulletin of the British Iron and Steel Federation, employment in the iron-foundry industry on December 8, 1951, was 152,680, an increase of 624, of whom 599 were males. Though the average weekly output of liquid steel in December was at 2,220 tons, 260 tons lower than that of November—due no doubt to the Christmas holidays—it was 430 tons higher than the production in 1950.

Southampton Area Meeting

The London branch of the Institute of British Foundrymen is holding a special meeting at Southampton on Wednesday, March 12, to which all interested foundrymen in the Southampton area as well as members are invited. The programme begins at 2.15 p.m. with a works visit to John I. Thornycroft & Company, Limited, Woolston, Southampton, followed by tea (as guests of the Company) in the works canteen. At 6 p.m. there will begin a discussion meeting, also in the canteen, at which the aims and activities of the Institute will be outlined. The programme will conclude with the showing of two films—"Bronze Founding" and "Cupola Practice."

Pig-iron Shortage Threatens Exports

A report in the "Yorkshire Observer" last week reveals that unless the allocation of pig-iron is increased there might result a loss of overseas trade in textile machinery and tools to Western Germany. According to a statement by Mr. H. Charlesworth (managing director of Wm. Whiteley & Sons, Limited, textile engineers, Huddersfield, a licence had been authorized by the Ministry of Supply for the erection of a mechanized foundry for the company at a cost of £150,000, yet now they declined an adequate allocation of pig-iron to keep the foundry running full time, their allocation being based on the needs of the old foundry. He added that they could turn out 100 tons of castings a week, but an allocation of 30 tons of pig-iron a month only allowed the production of 15 tons a week. They had contracts for textile machinery and machine tools in hand which could not be fulfilled unless the allocation was increased, and if deliveries were not made on time they would be faced with cancellations. Mr. Charlesworth added that Western Germany and the United States would then get the contracts.

A director of George Hattersley & Sons, Limited, loom-makers, Keighley, stated that the firm's supply of pig-iron in hand had never exceeded 10 days, and on occasion they had supplies only equal to three or four days' consumption. Their main difficulty, however, was not the allocation but getting manufacturers to execute orders for it. Although production has not been affected by the shortage, it was a very uneasy position.

R. W. Crabtree & Sons, Limited, engineers, Leeds, said a spokesman, have experienced a shortage at the user end of the trade for some considerable time, but they "just kept going" with no reserve.

Decline in Working Population

Ministry of Labour statistics, issued last week, show that the country's total working population fell by 75,785 between December 10 and January 14. Employment in the metals, engineering, and vehicles group rose by 10,000 to 4,210,000, and colliery manpower rose by 2,000 to 771,000. There was a fall of 8,000 in the basic industries, reducing this figure from 4,082,000 to 4,074,000.

The number of unemployed increased from 302,956 to 378,741, but out of this total, 117,600 had been unemployed more than eight weeks. This figure also includes 63,700 "temporarily stopped" people, which is said to mean people suspended from work on the understanding that they will shortly be reinstated.

Tirpitz for Scrap

Because of the high price of scrap metal, Norwegians are intensifying their efforts to salvage German battleships sunk in the fjords in 1940/45. It is now expected that all of the Tirpitz, sunk by the R.A.F. off Tromso in 1944, will be recovered. So far, only 6,000 tons have been salvaged in two years. Now a new 200-ton crane has been imported from Hamburg and with it the Norwegians hope to raise the remaining 50,000-odd tons in less than four years. The Tirpitz wreck is owned by a 32-year-old Oslo radio technician named Einar Hoevding, who formed a salvage company with two friends in 1945, and brought up wrecks totalling 150,000 tons. For the wreck of the Tirpitz he paid the Norwegian Government £650. Already it has yielded more than £50,000 worth of scrap.

Imports and Exports of Iron and Steel in January

The following tables, based on Board of Trade returns, give the tonnage and value of imports and exports of iron and steel in January. Figures for the same month in 1951 are given for comparison.

Total Exports of Iron and Steel

Destination.	Month ended January 31.		Month ended January 31.	
	1951.	1952.	1951.	1952.
	Tons.	Tons.	£	£
Channel Islands	609	635	49,290	55,724
Gibraltar	47	55	4,894	8,743
Malta and Gozo	317	224	22,639	26,950
Cyprus	701	139	45,612	12,550
Sierra Leone	253	412	20,570	43,509
Gold Coast	1,904	4,365	129,308	269,188
Nigeria	5,643	3,502	271,398	294,630
Union of South Africa	12,829	11,023	690,285	983,669
Northern Rhodesia	1,930	2,323	132,690	169,373
Southern Rhodesia	3,019	5,162	211,624	347,316
Tanganyika	1,717	2,310	91,321	174,885
Kenya	6,707	4,881	317,154	319,781
Uganda	465	1,128	33,320	61,324
Mauritius	581	615	37,835	55,295
Bahrein, Qatar and Trucial Oman	326	1,573	24,964	119,495
Kuwait		2,675		168,668
India	11,217	5,935	642,201	596,117
Pakistan	5,187	4,898	279,041	350,115
Malaya	6,613	8,148	397,224	599,117
Ceylon	3,067	1,721	182,026	154,357
North Borneo	158	358	9,668	22,601
Hongkong	7,586	1,799	315,145	151,474
Australia	42,722	30,835	2,062,522	2,272,475
New Zealand	15,675	11,109	892,573	922,558
Canada	13,710	12,637	681,268	833,723
Jamaica	1,613	3,130	110,368	225,404
Trinidad	2,534	5,111	165,339	321,599
British Guiana	559	462	40,096	41,699
Anglo-Egyptian Sudan	930	843	58,979	84,141
Other Commonwealth	2,057	3,477	138,323	285,041
Irish Republic	7,465	5,880	449,357	529,871
Soviet Union	71	1	8,055	192
Finland	3,137	4,518	171,174	303,602
Sweden	6,594	12,097	293,998	599,148
Norway	7,803	6,273	347,979	355,093
Iceland	265	198	21,982	20,492
Denmark	8,689	8,877	378,748	452,112
Poland	149	11	23,192	2,295
Germany	125	282	30,923	35,949
Netherlands	8,099	7,693	402,014	427,435
Belgium	1,235	947	110,875	171,657
France	1,117	337	75,385	71,729
Switzerland	1,181	881	93,126	132,164
Portugal	1,475	762	109,154	88,430
Spain	312	292	29,065	38,456
Italy	1,155	3,045	76,428	222,428
Austria	75	67	74,103	10,162
Yugoslavia	1,158	431	39,893	52,225
Greece	538	614	21,090	33,161
Turkey	117	684	15,730	65,361
Netherlands Antilles	347	1,644	21,896	92,272
Belgian Congo	227	292	23,058	37,552
Angola	380	1,514	23,087	74,482
Portuguese E. Africa	299	349	22,541	35,166
Canary Islands	95	83	5,225	10,018
Syria	358	34	15,237	4,342
Lebanon	1,070	591	49,615	53,455
Israel	1,981	826	112,252	65,412
Egypt	3,905	4,066	205,977	261,926
Morocco	1,124	23	84,035	9,392
Saudi Arabia	39	516	5,836	49,530
Iraq	2,413	4,275	131,189	218,098
Iran	5,204	2,109	311,504	84,388
Burma	1,136	1,161	59,551	103,626
Thailand	519	562	27,968	52,753
Indonesia	759	777	47,232	57,303
China	1,523	—	93,060	—
Philippine Republic	911	528	54,177	47,918
U.S.A.	17,915	2,649	677,594	294,092
Cuba	677	276	43,901	28,055
Colombia	1,054	542	60,439	42,976
Venezuela	2,862	3,955	178,907	243,334
Ecuador	61	671	6,358	44,844
Peru	1,265	875	73,543	71,985
Chile	1,523	502	68,920	48,049
Brazil	2,666	1,003	186,880	113,277
Uruguay	3,838	265	160,922	30,517
Argentina	6,237	2,478	389,808	280,429
Other foreign	2,277	1,378	166,520	120,025
TOTAL	264,101	219,319	14,137,180	16,158,699

Total Imports of Iron and Steel

From	M'th ended Jan. 31.		M'th ended Jan. 31.	
	1951.	1952.	1951.	1952.
	Tons.	Tons.	£	£
India	—	42	56	7,860
Canada	4,514	4,412	255,530	562,789
Other Commonwealth and Irish Republic	65	819	6,040	75,779
Sweden	1,890	1,968	157,584	255,339
Norway	4,179	5,057	278,531	394,483
Germany	1,282	7,588	72,853	614,854
Netherlands	6,169	8,070	152,105	429,982
Belgium	10,220	19,031	369,047	1,296,397
Luxembourg	8,152	8,717	258,885	500,406
France	23,257	32,666	504,129	1,213,517
Austria	14	8,018	430	247,146
U.S.A.	4,090	11,264	326,823	724,614
Other foreign	165	4,733	25,512	326,223
TOTAL	63,997	112,385	2,407,525	6,649,389
Iron and steel scrap and waste, fit only for the recovery of metal	85,560	50,403	847,964	1,157,360

Exports of Iron and Steel by Products

Product.	M'th ended Jan. 31.		M'th ended Jan. 31.	
	1951.	1952.	1951.	1952.
	Tons.	Tons.	£	£
Pig-iron	3,535	401	50,955	8,997
Ferro-tungsten	100	—	93,517	—
Other ferro-alloys	360	200	77,137	51,015
Ingots, blooms, billets, and slabs	1,438	70	44,150	5,801
Iron bars and rods	1,013	395	32,126	17,112
Sheet and tin-plate bars and wire rods	2,093	343	54,783	14,012
Bright steel bars	5,670	1,574	207,489	87,135
Alloy steel bars and rods	1,646	1,602	280,455	323,402
Other steel bars and rods	24,789	10,142	777,529	470,989
Angles, shapes, and sections	17,052	12,155	482,759	489,386
Castings and forgings	975	1,115	82,226	138,114
Girders, beams, joists, and pillars (rolled)	3,799	3,536	105,233	135,583
Hoop and strip	7,547	4,122	312,931	249,851
Iron plate	88	6	4,885	426
Tinplate	25,528	23,821	1,713,107	2,340,939
Tinned sheets	277	158	21,421	19,864
Terneplates, decorated tinplates, etc.	103	79	7,609	12,042
Steel plates (⅛ in. and over)	20,878	20,356	613,008	681,125
Galvanized sheets	9,033	5,753	554,715	480,623
Black sheets	12,894	13,745	623,152	853,150
Other plate and sheet	885	990	54,564	87,545
Cast-iron pipes up to 6 in. dia.	5,979	8,539	218,450	313,032
Do., over 6 in. dia.	5,387	6,855	164,475	221,743
Wrought-iron tubes	30,708	34,356	1,800,467	2,435,853
Railway material	22,217	16,992	648,896	752,162
Wire	7,458	5,351	430,260	412,888
Cable and rope	2,433	2,290	294,211	323,073
Wire nails, etc.	2,805	1,215	112,177	73,117
Other nails, etc.	1,441	1,159	115,275	130,798
Rivets and washers	633	498	41,165	43,968
Wood screws	341	433	58,807	93,548
Bolts, nuts, and metal screws	2,383	2,427	284,819	350,109
Baths	1,007	1,592	93,194	147,140
Anchors, etc.	622	1,067	47,808	88,861
Chains, etc.	945	1,019	227,105	204,497
Springs	575	707	63,896	84,829
Holloware	2,629	1,760	302,518	361,438
TOTAL, including other manufactures not listed above	264,101	219,319	14,137,180	16,158,699

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News in Brief

DERBY FOUNDRY TRADE SOCIETY held their annual dinner recently at the Corporation Hotel, Derby.

A PROFIT of £18,308,971 on trading in non-ferrous metals was made last year by the Ministry of Supply.

A FURTHER 70 MEN are to be dismissed from the British Railways carriage and wagon works at Derby. The total number dismissed is now 300.

THE ANNUAL DINNER AND DANCE of the Manchester Association of Engineers will be held at the Grand Hotel, Aytoun Street, Manchester, on Friday, March 14.

SHIPBUILDING AND REPAIRING in the north of England will be the subject of a one-hour feature to be broadcast by the B.B.C. in the North of England Home Service on March 25 at 8 p.m.

SINCE JANUARY 1,637 workers in the Midlands have been dismissed owing to the shortage of steel, it was stated by the Deputy Midland Regional Controller to the Ministry of Labour.

DAVIDSON & COMPANY, LIMITED, announce that their Manchester depot will move to 42, Deansgate, Manchester, 3, from March 3, 1952. The telephone is Blackfriars 6218.

THE TRUSTEES of the late Mr. William I. Dunlop, sole partner of Wm. Dunlop & Company, iron and steel merchants, etc., of Glasgow, have resolved to wind up the business as at January 31.

A 53-FT. DIESEL-ENGINED LAUNCH was shipped last Saturday to West Africa by John I. Thornycroft & Company, Limited. Built to the order of the Crown Agents for the Colonies, the boat is for the use of the Governor of Sierra Leone.

CONTRACTS have been received from the British Electricity Authority by Clarke, Chapman & Company, Limited, Gateshead, for the supply of boilers for the proposed new Stella South and Stella North power stations at Blaydon-on-Tyne.

PART OF THE ROOF of Norcroft Foundry, Norcroft Street, Listerhills, Bradford, was damaged by fire on February 24 due to a spark from the furnace. The outbreak was quickly extinguished by Bradford fire brigade and production was not affected.

THE ENGINEERING AND ALLIED EMPLOYERS' NATIONAL FEDERATION has received a claim from the Confederation of Shipbuilding and Engineering Unions for a £1 a week increase in the wages of apprentices, youths, and boys employed in general engineering.

THE PUBLISHERS, E. A. Mortimer, Limited, 215A, Uxbridge Road, West Ealing, London, W.13, have pointed out that the Author of the book on "Lead Toy Casting" recently reviewed in these columns was given as Mr. G. F. R. Lead, whereas this should have been Mr. G. F. Rhead.

IN FACE of world-wide competition Butterley Company, Limited, Ripley (Derby), has been awarded a £100,000 contract by Tasmanian Railways for 140 underframes, each 36 ft. long, for railway wagons. The company will start work on the frames as soon as possible and expects to complete delivery in May of next year.

REVENUE FROM TOLLS and dues obtained by the Tees Conservancy Commission during December amounted to £25,655, the highest December figure on record. Imports during the month were 269,657 tons, an increase of nearly 30,000 tons on the corresponding month of 1950. Exports totalled 134,416 tons, or 26,373 tons more than in December, 1950.

PRESIDENT of the Engineering and Allied Employers' National Federation, Sir William Wallace told members of the Coventry and District Engineering Employers' Association: "There is every evidence that, if we can keep ourselves reasonably free from planners, controllers, totalitarians and exploiters of other people's achievements, our future will be secure."

STEEL PRODUCED in the Sheffield district during January amounted to an average of 44,400 tons a week, compared with 45,400 tons a week in the corresponding period of last year. The decline was mainly due to shortages of raw materials, chiefly scrap. These shortages are expected to continue until at least the second half of the year, when American imports may ease the situation. It is still not certain how much of the American steel will come to Sheffield.

THE POSTMASTER GENERAL, the Earl De La Warr, on February 21, visited Telcon Works, Greenwich, of the Telegraph Construction & Maintenance Company, Limited, including the plant of Submarine Cables, Limited, owned jointly by Telcon & Siemens Bros. & Company, Limited, which is housed at Telcon Works. The Postmaster General, who was received by Mr. J. N. Dean, managing director, and Mr. J. A. Lawson, chairman, of Submarine Cables, Limited, was greatly interested in the manufacturing facilities for plastic-insulated communication cables both for submarine and overland operation, together with the general layout of the factory and its strategic importance.

THE ORGANIZERS of the 1952 British Industries Fair have taken steps to dispose of a rumour now circulating in Western Europe that there will be no printing machinery section at the fair. Mr. E. Bower, director of the B.I.F., has written to United Kingdom trade officials in 63 countries inviting their immediate co-operation to inform interested buyers that, far from there being no printing machinery at this year's B.I.F., the section will be well up to its average representative strength of post-war years. Exhibits of 40 firms will occupy 23,555 sq. ft. of actual stand space on the same ground floor site at Olympia, London, where last year the section became a popular centre of interest.

AFTER A MEETING of the Midland Regional Board for Industry on February 19, Mr. Barry Kay, Regional Controller for the Board of Trade, stated that, whereas it is too early to assess the complete results of the new steel distribution scheme, so far, few complaints have been brought to notice. "Firms are of course, extremely anxious about the maintenance of supply of material," he said, "but where representations are made by firms, a re-examination is made with a view to carrying out the Government's policy with the least hardship and dislocation." It was reported to the meeting that unemployment in the Midland Region rose to 12,998 on January 16.

Italians for Northants Ironworks

A furnace, owned by the Kettering Iron & Coal Company, Limited, which has been idle since May, 1950, is to be brought back into production, using as operatives 70 Italians, who arrived at Kettering recently. The men, who will first undergo training, are expected to increase the company's pig-iron output by about 1,200 tons a week.

Thirty more Italians are to join the firm shortly. It is understood that there is a dearth of local labour.